How we Measure Angles

Marta Gallart Rosas i grup CLIL-SI/ GREIP (suport en la planificació i experimentació)

IES La Roca

Curs: 2005-6, 2006-7

Objectius principals: aprendre a fer operacions amb el Sistema Sexagesimal i el Sistema Internacional d'Unitats per mesurar angles (radiants), i millorar les habilitats orals dels alumnes en parlar de matemàtiques.

Continguts principals: aprendre a fer operacions amb la calculadora científica (sumar i restar en el sistema sexagesimal, convertir angles en radiants i viceversa, etc), aprendre a construir un discurs oral estructurat i comprensible per a l'audiencia.

Agraïments

Vull expressar el meu agraïment als alumnes de 1r d'ESO del curs 2006-2007 de l'IES La Roca , de La Roca del Vallès, amb els quals he dut a terme el pilotatge d'aquesta seqüència didàctica, a Zoraida Horrillo pel seu ajut i els seus consells, a Ester González per la revisió del primer text en anglès, a Terry Cartin pel seu ajut constant, a Xavier Fontich pel seu suport i especialment a Cristina Escobar coordinadora del grup de recerca ARIE, que va organitzar la Primera Trobada de semiimmersió a Catalunya el 25 d'abril de 2007, on va ser presentada aquesta experiència, per les seves orientacions, encoratjament i confiança.

Índex

Objectius i tipus d'activitats

How we measure angles

FASE 1	OBJECTIUS LLENGUA ANGLESA	OBJECTIUS MATEMÀTIQUES	ACTIVITAT. DESCRIPCIÓ
Exploració	- Familiaritzar-se amb el vocabulari en anglès de conceptes que els alumnes ja coneixen sobre els angles i la seva mesura. - Familiaritzar-se amb el vocabulari i les frases necessàries per a poder jugar. - Mantenir una conversa en anglès a través del joc. - Reflexionar sobre el que han après, i com ho han après, expressar els dubtes i el seu grau de satisfacció amb l'activitat.	Recordar conceptes coneguts sobre els angles i la seva mesura.	- **What is an angle ?.** Fitxa 1.Grups de 2. Parlar, buscar al diccionari i escriure. - **Using the protractor.** Fitxa 2. Grups de dos. Parlar i mesurar amb el transportador. - **Angles relationship.** Fitxa 3. Grups de dos. Parlar i escriure. **- Type of angles**. **Playing dominoes.** *Preparació.* **Type of angles**. Grups de 4.Fitxa 4. Parlar i escriure. **Domino Terms and Language.** Grups de 4.Fitxa 5. Parlar i escriure. Trobar els dobles. **How to play.** Grups de 4. Fitxa 6.Explicar les frases d'interacció, escriure-les en cartolina i penjar-les a les parets de la classe. Parlar i escriure. *Execució.* **Playing dominoes.** Grups de 4. Juguen al dòmino. **- Learning diary.** Individual. Escriure.

How we measure angles

FASE 2	OBJECTIUS LLENGUA ANGLESA	OBJECTIUS MATEMÀTIQUES	ACTIVITAT. DESCRIPCIÓ
Introducció de nous continguts de matemàtiques, i vocabulari específic .	- Aprendre conceptes nous directament en anglès.	- Recordar el sistema sexagesimal. - Saber sumar i restar angles en sistema sexagesimal, fent servir la calculadora científica. - Familiaritzar-se amb el concepte de radian com a unitat de mesura SI. - Utilitzar factors de conversió. - Aprendre a convertir graus sexagesimals a radians i viceversa	**- Sexagesimal system.** Grups de 2. Fitxa 7. Sumar i restar angles amb la calculadora científica. Parlar i escriure. - **Radian Measure of Angles.** Grups de 2. Fitxa 8. Parlar, utilitzar la calculadora científica i escriure.
	- Mantenir una conversa en anglès a través del joc. .	- Associar els valor dels angles més comuns (mesurats en graus o en radians) i amb el seu dibuix sobre el cercle o amb sectors circulars	- **Equivalences between angles. Cards game.** *Preparació.* **Card Terms and Language.** Grups de 4.Fitxa 9. Parlar i escriure. **How to play.** Grups de 4. Fitxa 10 .Explicar les frases d'interacció, escriure-les en cartolina i penjar-les a les parets de la classe. Parlar i escriure. Registre de càlculs. Donar instruccions per a la utilització del transportador, de la calculadora científica i com s'han de registrar els càlculs que es facin a la graella de la fitxa 11. *Execució.* **Card game.** Grups de 4. Juguen a cartes, qualsevol joc de fer parelles que coneguin. Apuntar els càlculs que fa cadascú a la fitxa 11.

		- Sintetitzar les instruccions de la calculadora i el que hem fet a classe.	**- Homework**. Individual. Fitxa 12. Fabricació **d'una "xuleta"**, que els càpiga a l'estoig i plastificada. En una cara hi ha d'haver les instruccions per a fer sumes i resten en sistema sexagesimal (ho poden trobar en anglès al llibret d'instruccions de la seva calculadora) i en l'altra , la relació entre graus sexagesimals i radians i com fer les conversions d'unitats.
	- Reflexionar sobre el que han après, i com ho han après, expressar els dubtes i el seu grau de satisfacció amb l'activitat.		**- Learning diary.** Individual. Escriure.

How we measure angles

FASE 3	OBJECTIUS LLENGUA ANGLESA	OBJECTIUS MATEMÀTIQUES	ACTIVITAT. DESCRIPCIÓ
-Verbalització	- Verbalitzar els raonaments i les estratègies que utilitzen.	- Assentar l'ús de la calculadora científica. - Adquirir agilitat en la conversió d'unitats. - Relacionar tots els continguts treballats. - Reforçar la utilització de la calculadora científica. - Evidenciar la utilitat dels factors de conversió per canviar d'unitats - Verbalitzar els raonaments i les estratègies que utilitzen. - Verbalitzar els procediments apresos. - Adquirir agilitat en la conversió d'unitats. - Relacionar tots els continguts treballats	- **Protractor game.** Grups de 4. Fitxa 13. Parlar. En aquesta activitat hi entra tot el que s'ha treballat a les sessions anteriors, però és sobretot una activitat de verbalització. Es tracta d'un joc de sobretaula tipus joc de l'oca, però enlloc d'oques hi ha transportadors, i en algunes caselles s'han de respondre preguntes (tipus trivial). Explicar les instruccions del joc. Jugar.
	- Discutir i argumentar com creuen que s'ha de fer el disc.	- Utilitzar el llenguatge formal i vocabulari específic propi de la unitat, en un discurs estructurat i comprensible.	**- Summary disc**. Grups de 4. **Fitxa 14.** Activitat manipulativa en que hauran de construir un disc del tipus dels discos horaris de la zona vermella d'aparcament, però que sigui un resum de tot el que han après aquest dies. Parlar.

	- Parlar durant un minut com a mínim i respondre les preguntes dels altres alumnes. - Reflexionar sobre el que han après, i com ho han après, expressar els dubtes i el seu grau de satisfacció amb l'activitat.		- **Presentation.** Grups de 4. Fitxa 15. Preparar l'exposició. Exposició de tots els grups. **- Learning diary.** Individual. Escriure.

Prova inicial

How we measure angles

PROVA INICIAL

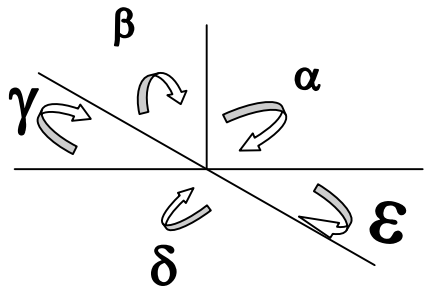
Nom i cognoms

1. Amb el transportador, dibuixa els angles següents i completa cada frase amb el paraula que hi correspongui d'entre les següents: *(2 punts)*

pla *agut* *recte* *obtús*

45º És un angle	90º És un angle .....
180º És un angle	150º És un angle .....

2. En el dibuix següent troba dos angles que siguin i completa la taula: *(2 punts)*



Complementaris
Consecutius
Oposats pel vèrtex
Suplementaris

3. Calcula a mà: *(2 punts)*

$$\begin{array}{rrrr} & 2^{\circ} & 45' & 6'' \\ + & 34^{\circ} & 32' & 59'' \\ \hline \end{array}$$

Comprova si ho has fet bé amb la calculadora científica. Explica quines tecles utilitzes.

$2^{\circ}\ 45'\ 6''\ +\ 34^{\circ}\ 32'\ 59'' =$

4. Escriu el nom de la unitat utilitzada en el Sistema Internacional d'Unitats per a la mesura dels angles. *(1 punt)*

5. Escriu l'equivalència entre aquesta unitat i els graus sexagesimals. *(1 punt)*

6. Utilitzant l'equivalència anterior com a factor de conversió, calcula quan és en unitats SI 45º. *(2 punts)*

SEQÜÈNCIA DIDÀCTICA Matemàtiques 1er ESO

How we measure angles

Student's book

Name _____

SESSION 1	**worksheet 1**

What is an angle?

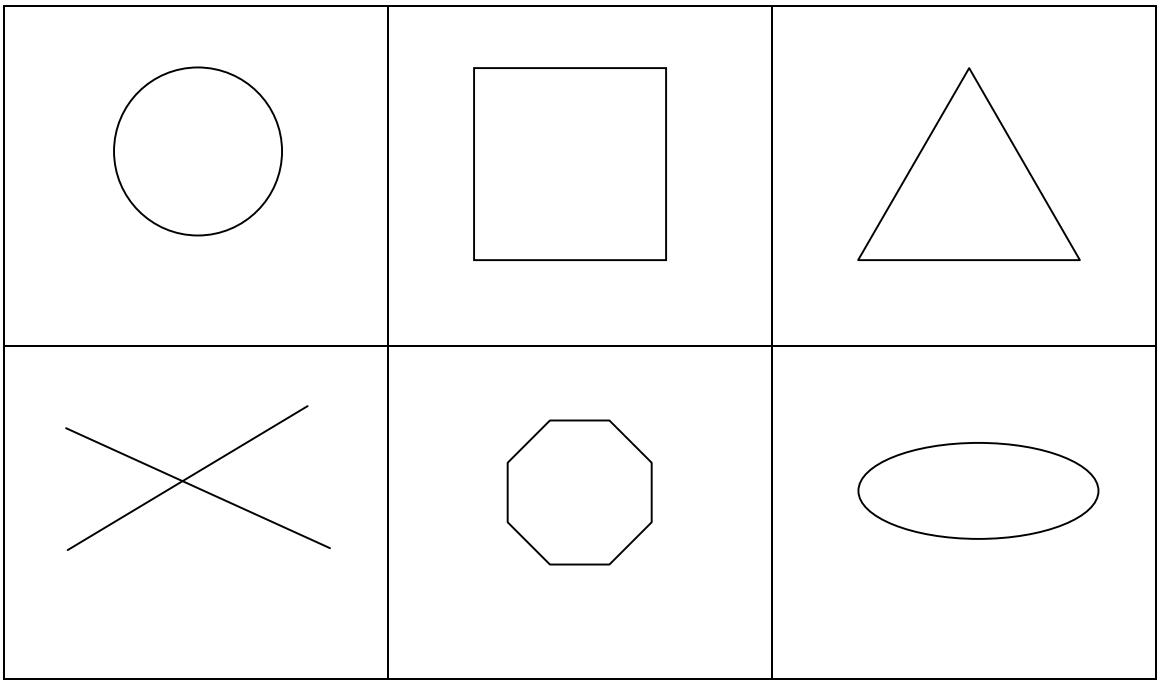
Work in pairs

Draw an angle.

Look up the word angle at the dictionary and copy the definition:

angle

In some of the following pictures there are angles. Mark the angles in red.



Creat per Marta Gallart Rosas amb el suport del grup CLIL-SI per a la planificació i l'experimentació.

SESSION 1	**worksheet 2**

Using the protractor

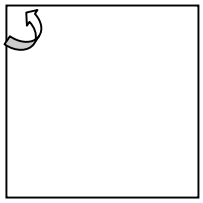
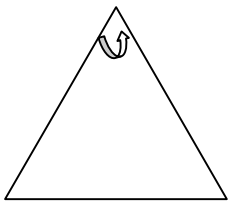
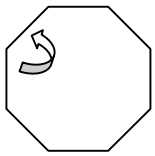
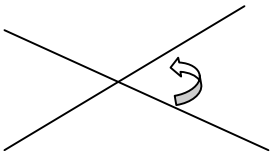
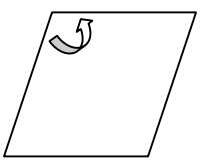
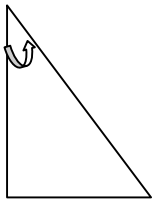
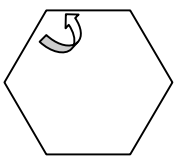
Work in pairs

Discuss if this statement suggests that an angle is a physical magnitude or not. Give a reason for your answer. Write it down into the square.

Angles are measured in degrees.

If it does, then you need a specific instrument in order to measure an angle. It is called **protractor**. It is graduated in sexagesimal degrees: 360º for a complete circle.

Use the protractor to measure the angles marked in the following drawings:

SESSION 1	**worksheet 3**

Angles relationship (part I)

Work in pairs

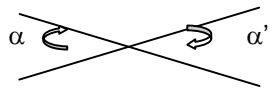
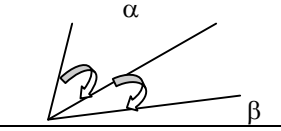
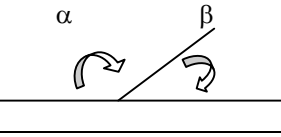
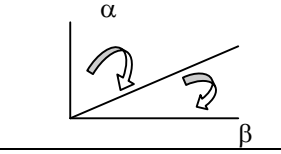
Discuss with your partner which is the correct relationship for every pair of angles.

α and α' are vertically **opposite angles** $\alpha = \alpha'$	α and β are **complementary angles** $\alpha + \beta = 90^o$	α and β are **adjacent angles** α besides β sharing a limb	α and β are **supplementary angles** $\alpha + \beta = 180^o$

Example for the conversation:

Joan – I think α and β here are supplementary angles because their they sum 90º
Laia - I don't agree because supplementary angles means they sum 180º

Copy the correct answer into the boxes.

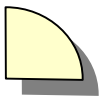
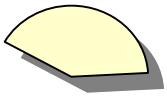
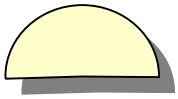
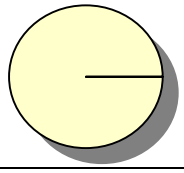
Drawing	Relationship
	
	
	
	

SESSION 1	**worksheet 4**

Type of angles

Groups of four

On the left there is a list of type of angles (shown with a drawing). On the right there is another list with their properties. Discuss and match the type of angle with its property.

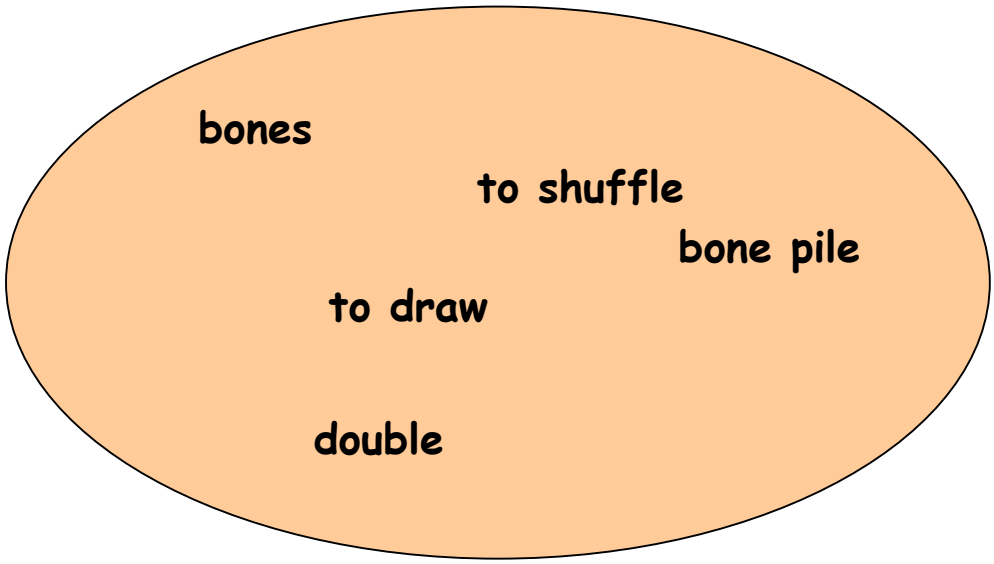
Type of angle	**Property**
acute angle 	**= 360º**
right angle 	**> 90º**
obtuse angle 	**< 90º**
straight angle 	**= 90º**
full angle 	**= 180º**

SESSION 1	**worksheet 5**

Domino Terms and Language

Groups of four

Here there are some domino terms you need to learn for the next activity.
Try to match every term with its definition. Discuss and give reasons for your choice.



- The actual playing pieces are ……
- A bone which contains the same number of pips at both ends is a ……
- To pick the bones for your hand out of a central pile is ……
- Spare bones left after the draw that may be used as a draw pile in some games is a ……
- To mix the bones while they are turned face down on the table is ……

Informació extreta de http://www.gamecabinet.com/rules/DominoTerms.html

SESSION 1	**worksheet 6**

How to play

Groups of four

Here there are some sentences you need to know in order to play (no matter which game) with other people. Discuss their meaning.

We turn the bones face down and we shuffle them
You begin
What's the meaning of this?
We have a double here
This measure (……) and this (……)
You have to draw
I pass
It's my turn
Wait a moment! Yes, it is. It's your turn now
It's finished. I won

Copy the ones your teacher tell you on a cardboard and stick them on the wall.

SESSION 2	**worksheet 7**

Sexagesimal system

Work in pairs

Fill in the gaps with the correct word.

This instrument is called _____. It is graduated in degrees: 360º for a complete circle.

*READING: What is the **Sexagesimal system**.*

It is a numeration system whose base is 60 (like 10 is the base for the decimal system, and 2 is the base for the binary system). This means that every superior unit has 60 inferior units. It is used in the measure of angles and arcs and as a result in the traditional measure of time.

Fill in the gaps:

1º = _____ ‘ 1 hour = _____ minutes
1’ = _____ “ 1 minute = _____ seconds

Let’s calculate together on the board: 30º 3’ 21” + 3º 21’59” =
Now, we are going to use the scientific calculator to do this. Search for a key on the calculator with the marks º ‘ “ on it and follow the teacher’s instructions to complete:

23º 31’ 45’’ – 5º 41’ 3’’ =	
5º12’ + 3º 2’’ + 5’ =	

Compare your answers with those of your partner.

SESSION 2 **worksheet 8**

Radian Measure of Angles

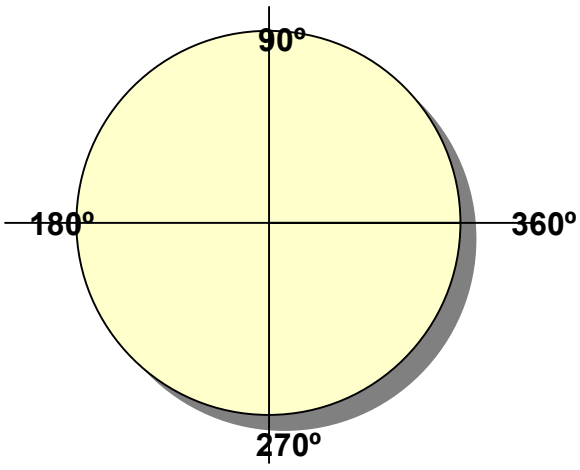
Work in pairs

READING

***radian**: angle unit in the IS of Units. Its symbol is rad.*
If a unit circle is drawn with the vertex of an angle at its centre, then the measure of this angle in RADIANS is the length of the arc that subtends the angle.

The circumference or a circle of radius r is $2\pi r$
The circumference subtends a full angle: 360 º
The full angle in radians is $\frac{2\pi r}{r} = 2\pi$ *rad*

So what is the relationship between degrees and radians?
We know that a full angle 360º has a measure of 2π rad, so what is the measure for a straight angle and for a right angle in radians? Look at the drawing and fill in the gaps. Discuss it with your partner and give reasons for your answer.



For a straight angle: 180º = ___ rad

For a right angle: 90º = ___ rad

We can use either of these equalities in order to convert radians to degrees and vice versa, as in the following examples:

- Converting Radians to Degrees $\frac{\pi}{4} rad \cdot \frac{180º}{\pi rad} = 45º$
- Converting Degrees to Radians $60º \cdot \frac{\pi rad}{180º} = \frac{\pi}{3} rad$

Following the examples:

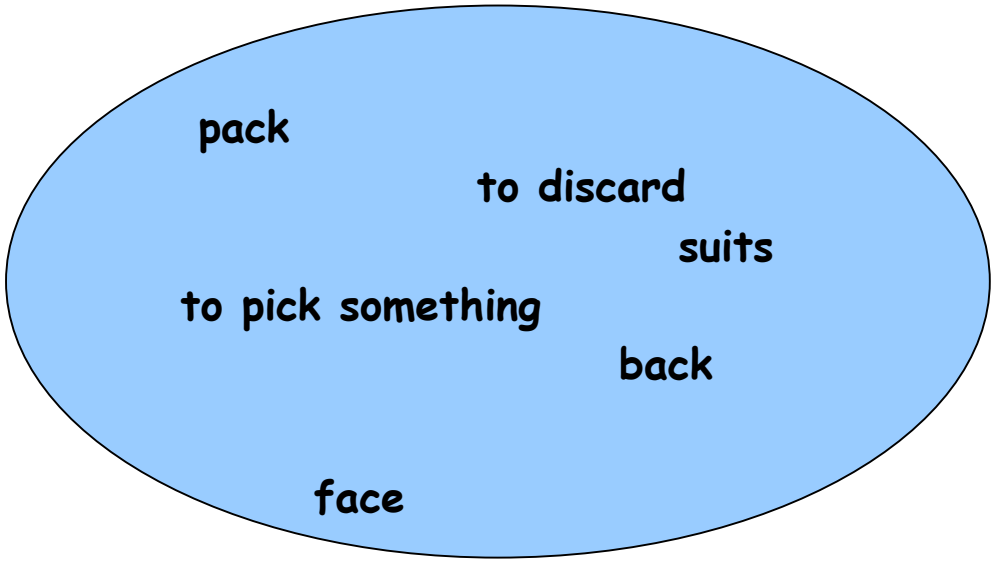
- *(Student A)* Find the radian measure of 225º
- *(Student B)* Change the measure $2\pi/3$ rad into degrees

SESSION 2 **worksheet 9**

Card Terms and Language

Groups of four

Here are some card terms you need to know for the next activity.
Try to match every term with its definition. Discuss and give reasons for your choice.



- The cards in a pack are identical in size and shape. The fixed number of pieces of card known as cards is a ……
- The side of the card that makes the card indistinguishable from the other is the ……
- To choose something is ……
- The four groups to whom belong the cards are the ……
- To get ride of some cards is ……
- The side of the card that makes the card distinguishable from the other is the ……

SESSION 2	**worksheet 10**

How to play

Groups of four

Here are some phrases you must know in order to play (no matter which game) with other people. Discuss their meaning.

Pick a card
Choose a card and hide it
It's your turn
You can discard this pair of cards
You can't discard this pair of cards because they aren't equivalent
I won

Copy the ones your teacher tell you on a cardboard and stick them on the wall.

SESSION 2	**worksheet 11**

Equivalences between angles
Card game

Groups of four

Individually register some pairs you discard. Give reasons for your choice.

SESSION 2	**worksheet 12**

Homework

Individually

Pay attention to what you have learnt in worksheet 7 and worksheet 8.
You have to concentrate on the most practical aspects:

- How do you do additions and subtractions in the sexagesimal system with your scientific calculator? Write it in the following square.

- How do you convert degrees into radians and vice versa? Write it in the following square.

Make a crib with them (A crib is the little piece of paper containing summarised information students usually use to cheat in the exams). Write what you have in the first square on one side of the crib, and what you have in the second square on the other side of the crib. Cover it with plastic.

SESSION 4	worksheet 13

Protractor game (part I)

Groups of four

You have to play on the cardboard with a dice and four counters, one for each player.

Instructions for the protractor game
(4 players maximum)

If a player falls in a

Yellow square:	*If your answer is correct, you can play again. If your answer is wrong, you lose your turn.*
Violet square:	*If your answer is correct, you can play again. If your answer is wrong, you lose your turn.*
Green square:	*You do what is written there.*
Red square:	*You do what is written there.*
Protractor square:	*You go forward to the next protractor square and you play again.*

*The **winner** is the first player arriving to the magenta square*

SESSION 4	**worksheet 13**

Protractor game (part II)

Groups of four

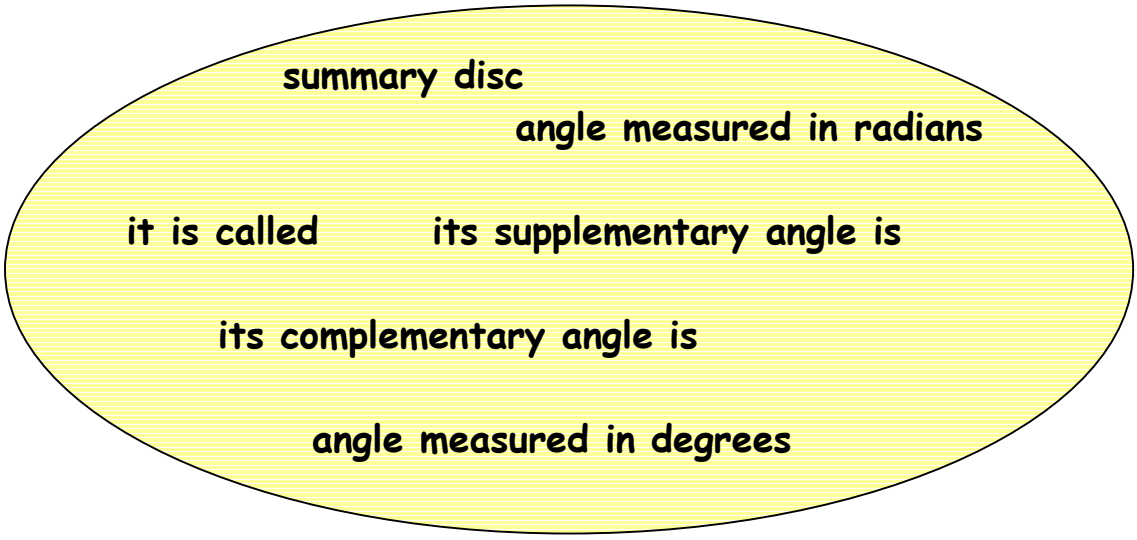
Here is a register. You have to register two of your correct answers: one from a violet card and one from a yellow card.

SESSION 5	**worksheet 14**

Summary disc

Groups of four

1. You have to assemble the two discs the teacher will give you. Discuss what has to be written in the arrows, depending on the relationship between the figures that appear on the holes. Choose from the following box a word or words for every concentric circle. Write them inside the grey arrows.



2. You have to make a summary of the most important thing you have learnt in the previous sessions.
   Four aspects are compulsory:
   - How to convert units
   - Type of angles
   - Angles relationship
   - How the summary disc works, and what information it can give you

   Write them in the cells and also on the back of your summary disc as a kind of crib.

SESSION 6	**worksheet 15**

Presentation

Groups of four

You have 15 minutes to prepare a presentation (about 4 minutes each group) of your summary disc.

You have to speak about:

- How to convert units
- Type of angles
- Angles relationship
- How the summary disc works, and what information it can give to you

Divide the four tasks among the members of the group. Everybody has to speak for a minute at least.

When you finish your presentation your classmates can ask you some questions. Be ready for that and prepare yourselves as well as you can.

While other groups do their presentation, you have to listen to them carefully and when they finish you can ask them questions as well. Write down at least two questions.

QUESTION 1
QUESTION 2
QUESTION 3
QUESTION 4

How we measure angles

Classroom materials

Learning diary cover

Learning diary

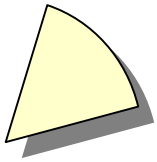
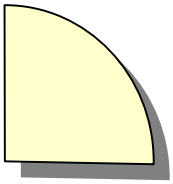
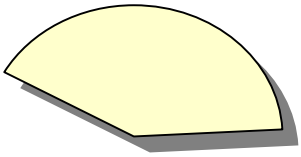
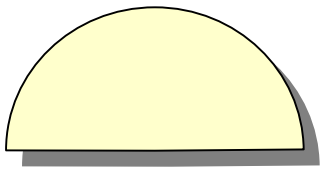
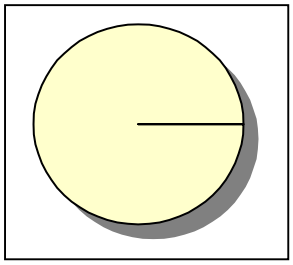
A learning diary is a tool you use to reflect on your learning experience. You can talk about the classes, the things you are happy with, what you are learning (maths and English), the things that surprise you,…

and feel free to say what you want to say.

Good luck.

Type of angles

How we measure angles

acute angle		**< 90º**
right angle		**= 90º**
obtuse angle		**> 90º**
straight angle		**= 180º**
full angle		**= 360º**

Dominoes game

How we measure angles

Dominoes

Bones

Doublets:

acute angle	**< 90º**

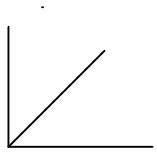
right angle	**90º**

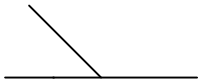
obtuse angle	**> 90º**

straight angle	**180º**

full angle	**360º**

How we measure angles

complementary angles	

suppemplementary angles	

Other bones:

acute angle	**right angle**

acute angle	**obtuse angle**

acute angle	**straight angle**

How we measure angles

< 90º	**full angle**

< 90º	**complementary angles**

< 90º	**suppemplementary angles**

right angle	**obtuse angle**

right angle	**straight angle**

90º	**full angle**

How we measure angles

90º	**complementary angles**

90º	**suppemplementary angles**

obtuse angle	**straight angle**

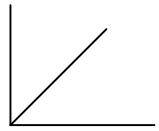
> 90º	**full angle**

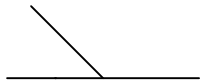
> 90º	**complementary angles**

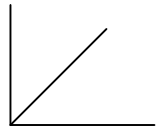
> 90º	**suppemplementary angles**

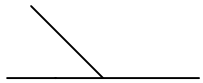
How we measure angles

180º	**360º**

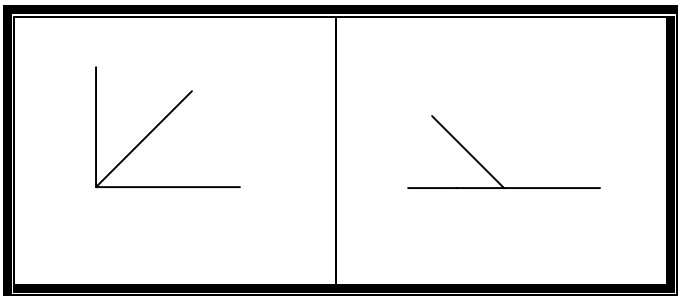
180º	

180º	

360º	

360º	

How we measure angles



Card game

Card game. Instructions (4 players)

1

- *One player chooses a card from the pack and hides it without looking at it.*

2

- *The players have to match as many pairs of equivalent cards as possible and can then discard them.*

3

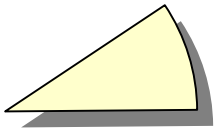
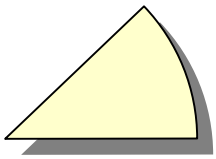
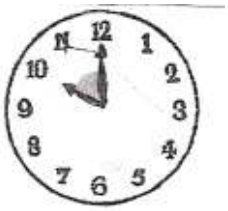
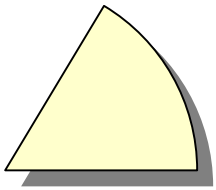
- *All the players have 12 cards at the beginning. One of them has only 11.*

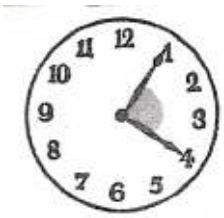
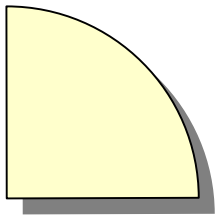
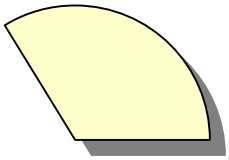
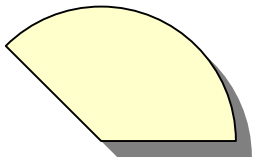
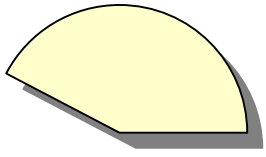
4

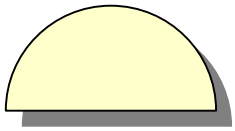
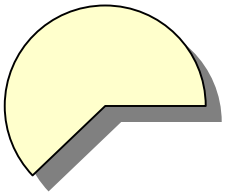
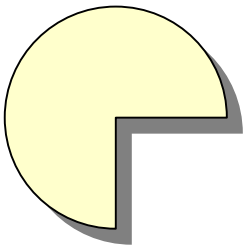
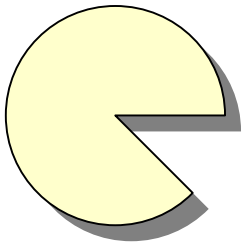
- *The next step is to pick one card from another player (in turn) and try to make an equivalent pair to be discarded.*

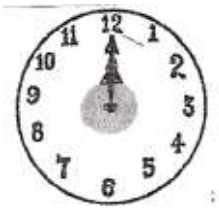
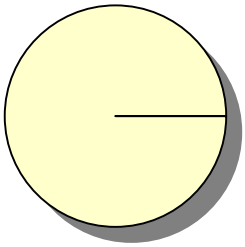
*The **winner** is the first person who get ride of their cards.*

CARDS

30°	$\frac{\pi}{6} rad$		
45°	$\frac{\pi}{4} rad$		
60°	$\frac{\pi}{3} rad$		

90°	$\frac{\pi}{2} rad$		
120°	$\frac{2\pi}{3} rad$		
135°	$\frac{3\pi}{4} rad$		
150°	$\frac{5\pi}{6} rad$		

180°	πrad		
225°	$\frac{5\pi}{4} rad$		
270°	$\frac{3\pi}{2} rad$		
315°	$\frac{7\pi}{4} rad$		

360°	$2\pi rad$		

Protractor game

protractor game (board)

Instructions for the protractor game
(4 players maximum)

If a player lands on a

Yellow square:	*If your answer is correct, you can play again. If your answer is wrong, you lose your turn.*
Violet square:	*If your answer is correct, you can play again. If your answer is wrong, you lose your turn.*
Green square:	*Follow the instructions given.*
Red square:	*Follow the instructions given.*
Protractor square:	*You go forward to the next protractor square and you play again.*

*The **winner** is the first player to arrive at the magenta square.*

How we measure angles

Fitxes de càlcul (imprimir-ho en paper violeta)

5º40'23" + 32º25'48"= **Explain how you'll do it.** Answer: 38º6'11"	**Express $\frac{\pi}{6} rad$ in degrees.** **Explain how you'll do it.** Answer: 150º
35º40'2" - 32º25'48"= **Explain how you'll do it.** Answer: 3º14'14"	**Express $\frac{5\pi}{4} rad$ in degrees.** **Explain how you'll do it.** Answer: 225º
9º50'23" + 2º25'48"= **Explain how you'll do it.** Answer: 12º16'11"	**Express $\frac{\pi}{3} rad$ in degrees.** **Explain how you'll do it.** Answer: 60º
5º23" + 32º2'48"= **Explain how you'll do it.** Answer: 37º3'11"	**Express $\frac{7\pi}{4} rad$ in degrees.** **Explain how you'll do it.** Answer: 315º
5º40'23" + 32º35'= **Explain how you'll do it.** Answer: 38º15'23"	**Express $2\pi rad$ in degrees.** **Explain how you'll do it.** Answer: 360º
5º40'23" + 32º25'48"+ 15º23" = **Explain how you'll do it.** Answer: 53º6'34"	**Change the measure $\frac{\pi}{8} rad$ into degrees.** **Explain how you'll do it.** Answer: 22,5º

5º40'23" + 32º25'48"-31º59'= **Explain how you'll do it.** Answer: 6º7'11"	**Change the measure $\frac{\pi}{6}rad$ into degrees.** **Explain how you'll do it.** Answer: 30º
17º40'2" + 5'4"= **Explain how you'll do it.** Answer: 17º45'6"	**Change the measure $\frac{3\pi}{4}rad$ into degrees.** **Explain how you'll do it.** Answer: 135º
5º50'56" + 55'58"= **Explain how you'll do it.** Answer: 6º46'54"	**Change the measure $\frac{2\pi}{3}rad$ into degrees.** **Explain how you'll do it.** Answer: 120º
5º33" + 3º45'44"= **Explain how you'll do it.** Answer: 8º46'17"	**Change the measure $\frac{\pi}{2}rad$ into degrees.** **Explain how you'll do it.** Answer: 90º
5º40'23" + 2º48"= **Explain how you'll do it.** Answer: 7º41'11"	**Name a pair of complementary angles.** **Explain how you'll do it.** Answer: Every pair of angles whose sum is 90º
Find the radian measure of 45º. **Explain how you'll do it.** Answer: $\frac{\pi}{4}rad$	**Name a pair of supplementary angles.** **Explain how you'll do it.** Answer: Every pair of angles whose sum is 180º

How we measure angles

Find the radian measure of 210°. Explain how you'll do it. Answer: $\frac{7\pi}{6} rad$	**Find the complementary angle of 45°. Explain how you'll do it.** Answer: 45°
Find the radian measure of 330°. Explain how you'll do it. Answer: $\frac{11\pi}{6} rad$	**Find the complementary angle of 10°. Explain how you'll do it.** Answer: 80°
Find the radian measure of 15°. Explain how you'll do it. Answer: $\frac{\pi}{12} rad$	**Find the complementary angle of 30°. Explain how you'll do it.** Answer: 60°
Find the radian measure of 135°. Explain how you'll do it. Answer: $\frac{3\pi}{4} rad$	**Find the complementary angle of 50°. Explain how you'll do it.** Answer: 40°
Find the radian measure of 270°. Explain how you'll do it. Answer: $\frac{3\pi}{2} rad$	**Find the supplementary angle of 90°. Explain how you'll do it.** Answer: 90°
Find the radian measure of 360° Explain how you'll do it. Answer: $2\pi rad$	**Find the supplementary angle of 60°. Explain how you'll do it.** Answer: 120°

Find the radian measure of 100°. Explain how you'll do it. Answer: $\frac{5\pi}{9} rad$	**Find the supplementary angle of 120°. Explain how you'll do it.** Answer: 60°
Find the radian measure of 300°. Explain how you'll do it. Answer: $\frac{5\pi}{3} rad$	**Find the supplementary angle of 167°. Explain how you'll do it.** Answer: 13°

How we measure angles

Fitxes de coneixements (imprimir-ho en paper groc)

When are complementary a pair of angles? Answer: When they sum 90º	**Explain what is the IS of Units. Name the unit used in the International System of Units, for angles.** Answer: The IS of Units is a system of units all countries agree to use // radian
When are supplementary a pair of angles? Answer: When they sum 180º	**The numbers and marks on the protractor are radians or degrees? Give reasons for your answer.** Answer: Degrees because there are 180º in a semi-circle or 360º in a complete circle.
When are adjacent a pair of angles? Answer: When they are one beside the other, and they are sharing one half straight line and the vertex point.	**How many angles are inside a triangle? Explain it using a drawing, if necessary.** Answer: 3
What is a full angle? Answer: It's an angle whose measure is 360º or 2π rad.	**How many angles are inside a square? Explain it using a drawing, if necessary.** Answer: 4
What is an acute angle? Answer: It's an angle whose measure is <90º or $<\frac{\pi}{2}rad$	**How many angles are inside a circle? Give reasons for your answer.** Answer: None
What is an obtuse angle? Answer: It's an angle whose measure is >90º or $>\frac{\pi}{2}rad$	**What type of angles are the angles inside a square? Give reasons for your answer.** Answer: They are all right angles

How we measure angles

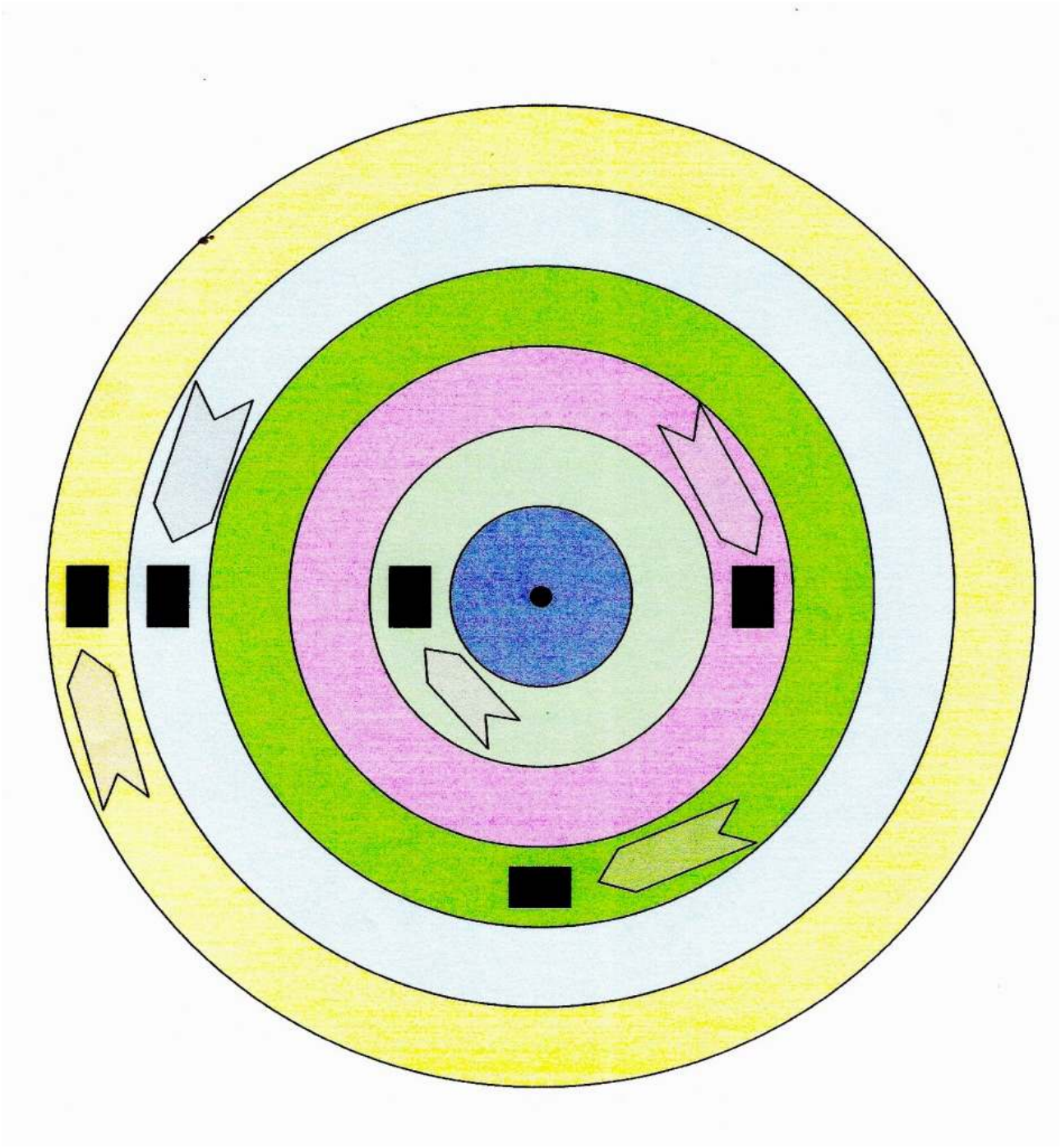
What is a right angle? Answer: It's an angle whose measure is 90º or $\frac{\pi}{2} rad$.	**How many degrees there are in a full angle?** **Give reasons for your answer. Use a drawing and the protractor if necessary.** Answer: 360º
What is a straight angle? Answer: It's an angle whose measure is 180º or π rad.	**Name the instrument we use to measure angles. Tell the differences between the one you have, and the one you see in this board.** Answer: Protractor. Can be a semi-circle or a complete circle.
Explain why an angle is a physical magnitude? Answer: Because they have a property that can be measured: the distance between their limbs.	**How many minutes there are in a degree?** **Give reasons for your answer.** Answer: 60'
Name two units, from different unit systems, used in the angles measure. **Tell at what unit system belongs each one.** Answer: *sexagesimal*/ degree // radian (IS)	**How many seconds there are in minute?** **Think of another physical magnitude which is measured in these units also.** Answer: 60" // Time
What is the relation between degrees and radians we use to change measures given in one of this units into the other? **How we use it?** Answer: $180º = \pi rad$	**How many radians there are in a full angle?** **Give reasons for your answer.** Answer: 2π rad
How many degrees there are in a right angle? **Give reasons for your answer. Use a drawing and the protractor if necessary.** Answer: 90º	**How many radians there are in a right angle?** **Give reasons for your answer.** Answer: $\frac{\pi}{2} rad$

Creat per Marta Gallart Rosas amb el suport del grup CLIL-SI per a la planificació i l'experimentació.

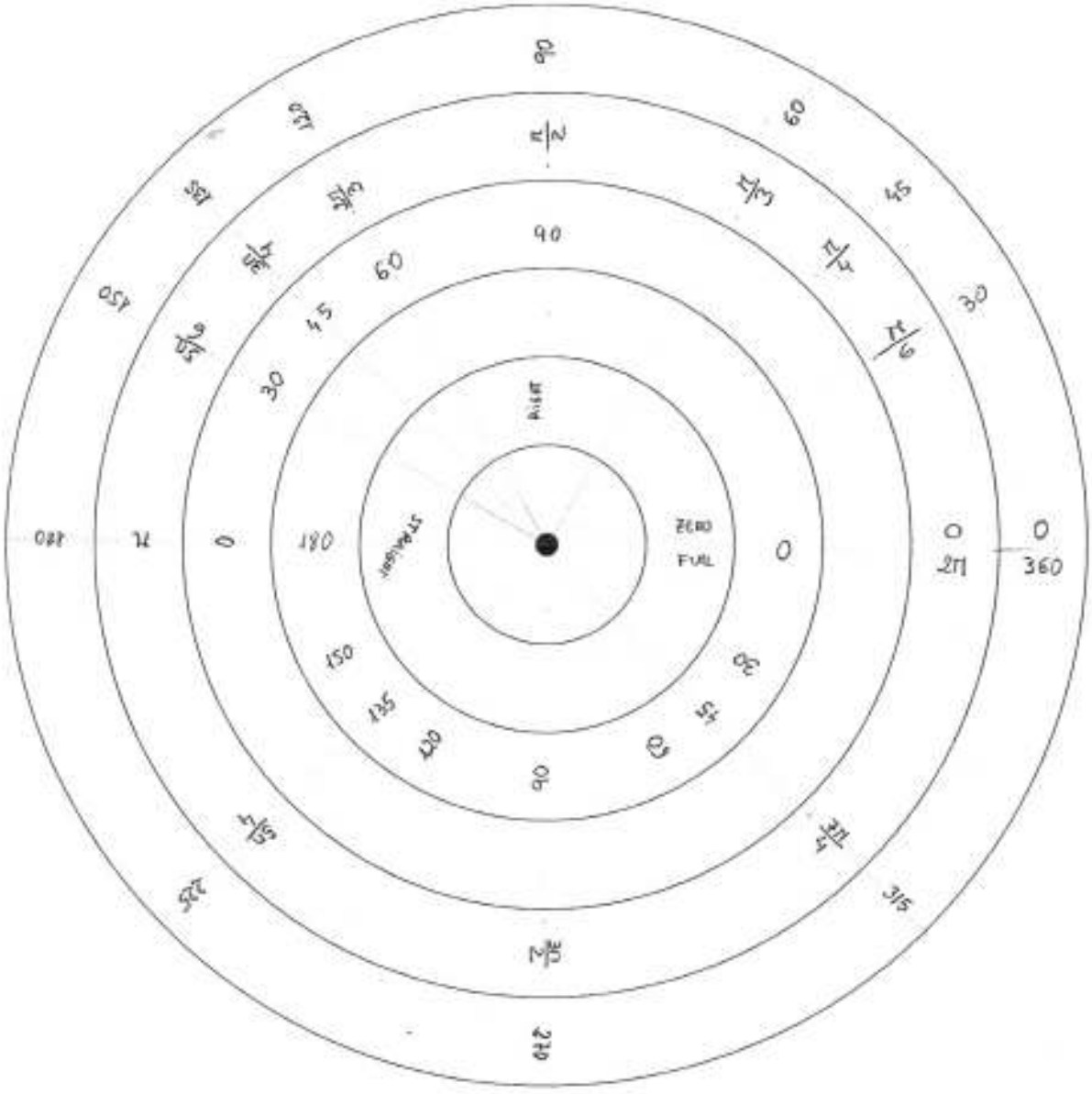
How many degrees there are in a straight angle? **Give reasons for your answer. Use a drawing and the protractor if necessary.** Answer: 180°	**How many radians there are in a straight angle?** **Give reasons for your answer.** Answer: π rad

Summary disc

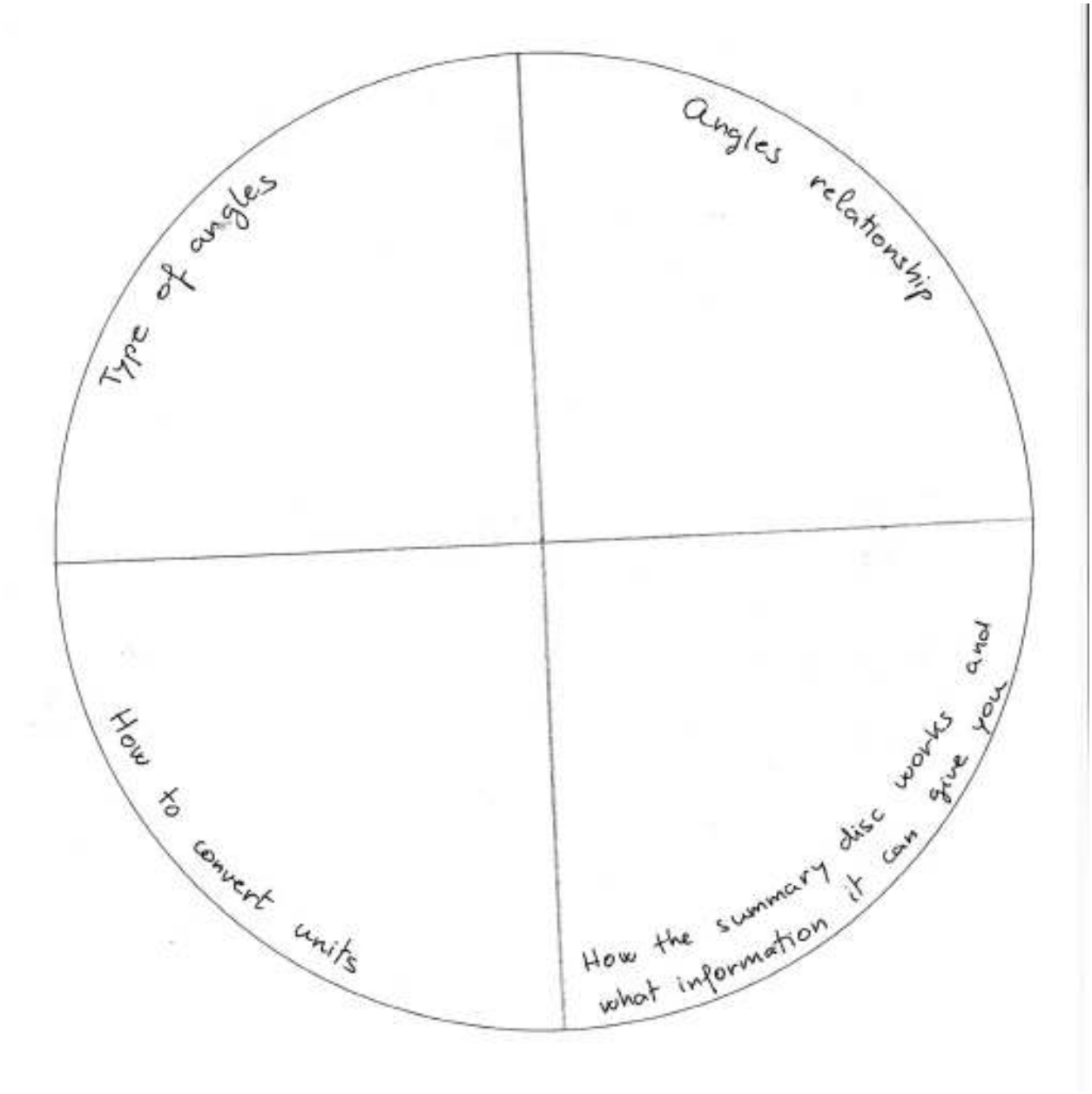
How we measure angles



How we measure angles



How we measure angles



Presentation

ESTRUCTURE

1. Name, date
2. “I am going to talk about...”
3. Your explanation
4. “This is all I wanted to explain.”
5. “Do you have any questions?”
6. Thank you.
7. “_____, now it’s your turn.”

CLASS ASSIGNMENT

1. Check your presentation
2. Rehearse with a partner
3. WHILE YOU ARE LISTENING, complete the reverse of the disc
4. Ask questions to complete it.

PRESENTATION

- Purpose:

  To explain something

  To an audience

- How?

1. Give enough details
2. Say complete sentences
3. Rehearse with a partner
4. Make sure they can listen to you
   - don’t speak too low
   - don’t talk to → the blackboard
   - don’t talk to → a sheet of paper
5. Look at your audience.

Taula elaborada per Zoraida Horrillo

VOCABULARY:
Angles relationship

- Relationship
- Adjacent
- Complementary
- Supplementary
- Opposite
- Pair
- Angle

VOCABULARY:
Type of angles

- Property
- Acute
- Right
- Obtuse
- Straight
- Full
- Angle
- Degrees

VOCABULARY:
How to convert units

- Sexagesimal
- Degrees
- Radians
- IS of Units
- Measure
- Angle
- Converting units

VOCABULARY:
Summary disc

- Sexagesimal
- Degrees
- Radians
- IS of Units
- Measure
- Angle
- Converting units
- Rotation
- Disc
- Complementary
- Supplementary
- Right
- Straight
- Full
- Zero

Exam

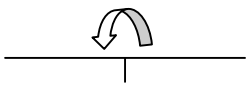
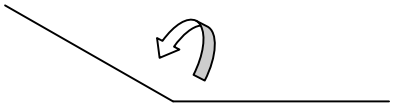
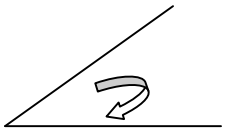
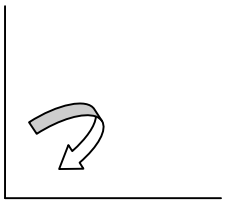
How we measure angles

EXAM

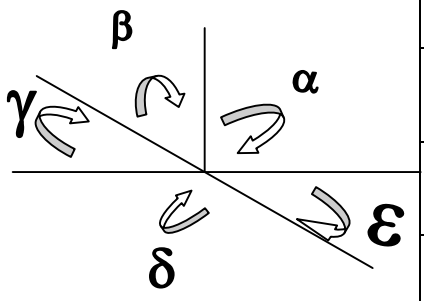
Name

1. Measure the following angles using the protractor. Fill in the gaps with a property from below: *(2 points)*

right *acute* *obtuse* *straight*

 Is an _____angle	 Is an _____angle
 Is an _____angle	 Is an _____angle

2. Look at this picture *(2 points)*

	**Name a pair of adjacent angles: ___ and ___**
	Name a pair of supplementary angles: ___ and ___
	Name a pair of complementary angles: ___ and ___
	Name a pair of vertically opposite angles: ___ and ___

How we measure angles

3. Do the next sum: *(2 points)*

$$\begin{array}{rrrr} & 5^{\circ} & 53' & 16'' \\ + & 4^{\circ} & 12' & 59'' \\ \hline \end{array}$$

Compare your answer with the one that gives you your scientific calculator. Explain how you did it.

$5^{\circ}\ 53'\ 16''\ +\ 4^{\circ}\ 12'\ 59'' =$

4. Name the unit used in the International System of Units for angles. *(1 point)*

5. How many radians are in 180º. *(1 point)*

6. Change into degrees $\frac{\pi}{6} rad$. *(2 points)*